1. Introducing EURANDOM

EURANDOM is a European research institute for the study of stochastic phenomena. Many real life systems and processes in our society are nondeterministic by nature. Mathematical modelling, very useful in analysing, understanding and possibly optimizing such systems, requires therefore the application of "nondeterministic" mathematics: probability theory, mathematical statistics and the stochastic part of operations research. EURANDOM will carry out research in this area of mathematics and its applications. In short, EURANDOM will be, as the name suggests a EUropean institute for the study of RANDOMness. Formally it is an acronym for "European Unit for Research and Analysis of Non-Deterministic Operational Models". The same elements: Europe, mathematics and randomness are used in the EURANDOM logo. The triangle symbolizes mathematics, the star Europe, and the cloud of points which form the star randomness.

EURANDOM is funded by grants from the government of the Netherlands, Eindhoven University of Technology, the Netherlands Organization for Scientific Research, the European Community (Stimulus) and supported by the national research organizations in a number of European countries. The concept of such a research institute was also supported strongly by industrial and financial institutions.

EURANDOM is located on the campus of Eindhoven University of Technology in the Netherlands.

Research Profile

In its choice of research topics, EURANDOM will be guided by scientific interest as well as potential applicability of the results. Research at EURANDOM will primarily be focused on :

- applications that will enhance the role of stochastics in our society, in particular in service, trade, banking and industry, as well as the public sector,
- applications in the natural and life sciences.

EURANDOM is interested in performing strategic research in collaboration with industries or other groups of users. A part of the research of EURANDOM will be interdisciplinary and will entail collaboration with scientists in other disciplines. The methodology developed by EURANDOM will often be computationally intensive and computer implementation and simulation will play an important role at certain stages of the work.

Scientific Staff

To retain the necessary flexibility only a small percentage of the scientific staff will have long term appointments, in the order of five years. This applies to the scientific director and key researchers who play a major role in a research project. The vast majority of the scientific staff will have appointments ranging from a few weeks for visiting senior consultants to two years for researchers on leave from their home institutions or post-doctoral fellows and four years for graduate students. Of course such contracts may be re-negotiated after a two year period, but on no account should this lead to any kind of permanent employment. A staff of 30-40 persons is envisaged in the steady state. The staff is recruited internationally.

Research Projects

At any time, EURANDOM will carry out a limited number of research projects. As EURANDOM will employ almost exclusively temporary staff, the group of researchers working at EURANDOM will change continuously over time. As a research project develops, there will be an accumulation of expertise at the institutions of scientists who have participated in the project. The program at EURANDOM will then be terminated and a network of institutions can take over this now well established research activity. This moment should arrive after five, or at most ten years. EURANDOM will then transfer resources to another project. Throughout the life of a research project, contact with outside experts will be maintained through workshops and an active visitors program. Great attention will be given to the dissemination of the research results to a wide group of potential users and/or scientists in the substantive area investigated. In this way EURANDOM will foster the growth of a research network in the field of stochastics.

At the moment research programmes are being formulated in the following areas :

- Complex stochastic models
  The advent of high speed computing has made possible the analysis of highly complex models of practical situations. Important areas are spatial statistics, image analysis, statistical inverse problems (such as computer tomography), neural networks, curve and surface estimation.
- Application of statistics
  The future of statistics depends on our ability to attack new and important problems in society and the sciences. Here are some examples. In areas such as the study of shopping behaviour or drug effectiveness extremely large data sets are available and their analysis poses formidable problems. Other challenging areas are molecular biology and industrial processes where statistical methods can play an important role.
- Financial Stochastics
  Here we see a meeting of mathematical disciplines such as financial econometrics, statistics, and probability theory and practical subjects such as investment theory, risk theory, insurance and actuarial sciences. Because of the increasing competiveness in financial markets new advances are almost immediately applied. Hot topics are asset pricing, risk management, volatility estimation, statistics for finance and the interplay between insurance and finance.
- Interacting Stochastic Systems
  The complex behaviour of systems with a large number of interacting randomly behaving components has long been an important topic in physics. More recently similar systems are studied in many other areas including in particular biology. Models for such phenomena as magnetism, chemical reactions, population dynamics and epidemics all come under this heading.
- Stochastic Networks
  Networks of workstations which execute tasks and generate tasks for other stations with a certain randomness are very useful models for telecommunication, transportation and even manufacturing systems. These models can be very helpful in the design of such processing systems and the evaluation of their performance. Massive research efforts are made in this area in the USA and the Far East and Europe has to catch up, concentrating on bridging the gap between theory and application.

Educational Aspects

The activities of EURANDOM will also have important educational aspects other than the direct transfer of knowledge. Post-docs and graduate students with mathematical training will learn about applications to problems in society and in the sciences. Those with a background in other sciences or engineering will be able to carry over the "stochastic" way of thinking to their own fields.

Facilities

EURANDOM will provide office space, meeting and colloquium rooms, a common room and lunch facilities for its staff in its own building. Adequate computing facilities and a modest in-house library will be available. Other facilities like extensive sports facilities or a large library may be found nearby on campus. The campus of Eindhoven University of Technology (5500 students, 1500 faculty) is very nice and situated near the center of Eindhoven. This city, in the south of the Netherlands, has a lot of cultural and recreational possibilities and is at the heart of a high tech industry area.

Board, Scientific Council

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Postdoc Positions and Graduate Scholarships at EURANDOM

EURANDOM is a European research institute for the study of random phenomena. It will conduct research in mathematical statistics, probability theory, operations research and their applications. The institute is funded by the Netherlands' Ministry of Education, Culture and Science and Eindhoven University of Technology. It is supported by the research organisations of various European Countries. EURANDOM is located on the campus of Eindhoven University of Technology in the Netherlands.

EURANDOM operates since in early 1998. Its scientific programme, still partly "under construction", contains research in the following areas (see p. 1-2):

- Complex stochastic models (including statistical image analysis and spatial statistics);
- Applications of statistics (including applications to biology and the analysis of large data sets);
- Financial stochastics;
- Interacting stochastic systems;
- Stochastic networks.

These research programmes will be carried out by postdoctoral fellows and graduate students under the direction of senior scientists in the relevant areas. Workshops and an extensive visitors' programme will be part of the scientific activities of EURANDOM.

Postdoctoral fellows will typically receive an appointment for 2 years with a possible extension. Graduate students will receive a scholarship for 1 year, which will be extended by 3 more years, contingent on a favourable review of their progress towards a Ph.D. degree.

Candidates for a postdoctoral fellowship or a graduate scholarship are encouraged to send a letter of application, together with a curriculum vitae, educational details and a list of publications (for postdocs) to

Prof. Dr. W.R. van Zwet, Scientific Director, or
Ir. W.J.M. Senden, Managing Director.

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Requests for further information may be sent to the same address.